

Remarks

Examiner Pham is thanked for the thorough Office Action.

In the Claims

Independent claims 1, 24 and 46 have been further amended to include the underlined limitation that “at least one of the one or more pillar structures are bi-layer having a lower lead-free portion and a coextensive upper solder material portion”.

Claim Objections

The Objection to Claims Misnumbered Claim 70 (The Second New Claim 70)

The objection to claim 70 (the second new claim 70) because of the following informalities: second new claim 70 has been misnumbered is acknowledged.

Applicant acknowledges that the second new claim 70 has been properly renumber as claim 71. This amendment corrects an inadvertent typographical error and does not narrow the scope of, now, numbered claim 71.

**Claim Rejections**

**The Rejection Of Claims 1, 2, 9, 11 To 13, 19, 24, 31, 33 To 35, 41, 46, 47, 54, 56 To 58, 64  
And 69 To 71 Under 35 U.S.C. §102(b) As Being Anticipated By Kondoh et al. (U.S.  
Patent No. 5,448,114)**

The rejection of claims 1, 2, 9, 11 to 13, 19, 24, 31, 33 to 35, 41, 46, 47, 54, 56 to 58, 64 and 69 to 71 under 35 U.S.C. §102(b) as anticipated by Kondoh et al. (U.S. Patent No. 5,448,114) (the '114 Kondoh Patent) is acknowledged.

**The Rejection Of Claims 3 To 8, 10, 16, 20 To 23, 25 To 30, 32, 38, 42 To 45, 48 To 53, 55,  
61 And 65 To 68 Under 35 U.S.C. §103(a) as Being Unpatentable Over Kondoh et al.  
(U.S. Patent No. 5,448,114) As Applied To Claims 1, 2, 9, 11 To 13, 19, 24, 31, 33 To 35,  
41, 46, 47, 54, 56 To 58, 64 And 69 To 71 Above, And Further In View Of Lee et al. (U.S.  
Patent No. 6,642,136 B1 And The Following Reasons.**

The rejection of claims 3 to 8, 10, 16, 20 to 23, 25 to 30, 32, 38, 42 to 45, 48 to 53, 55, 61 and 65 to 68 under 35 U.S.C. §103(a) as being unpatentable over Kondoh et al. (U.S. Patent No. 5,448,114) (the '114 Kondoh Patent) as applied to claims 1, 2, 9, 11 to 13, 19, 24, 31, 33 to 35, 41, 46, 47, 54, 56 to 58, 64 and 69 to 71 above, and further in view of Lee et al. (U.S. Patent No. 6,642,136 B1 (the '136 Lee Patent) and the following reasons is acknowledged.

Applicants' wish to briefly point up the claimed features of their invention which are believed to be not shown nor obvious from the teachings of known references in this field. The claims all clearly define: (1) a die comprising a substrate and one or more "pillar structures" (within the meaning of the disclosure of the instant specification and Figures) formed over the substrate in a pattern wherein at least one of the one or more pillar structures are bi-layer having a lower lead-free portion and a coextensive upper solder material portion; and (2) a method of forming such a die.

The amendments to independent claims 1, 24 and 46 add the further limitation that at least one of the pillar structures *are bi-layer* having a lower lead-free portion and a coextensive upper solder material portion. (emphasis added)

Thus independent claims 1, 24 and 46 are patentably distinct over Kondoh under 35 U.S.C. §102(b) as Kondoh does not disclose a bi-layer pillar structure but instead discloses a tri-layer pillar structure, e.g. as shown in Fig. 11, bump 4 (pillar structure) having lower (lead) layer 52, middle (copper) layer 53 and upper (40% lead/60% tin) layer 54.

Dependent claims 3 to 8, 10, 20 to 23, 25 to 30, 32, 42 to 45, 48 to 53, 55 and 65 to 68 (and claims 69 to 71) distinguish over Kondoh and Lee in combination under §103(a) because neither Kondoh nor Lee, separately or in combination, does / do

not disclose or fairly teach *bi-layer* pillar structures having a lower lead-free portion and an upper solder material portion. Again, as discussed above, Kondoh discloses a tri-layer pillar structure, e.g. as shown in Fig. 11, bump 4 (pillar structure) having lower (lead) layer 52, middle (copper) layer 53 and upper (40% lead/60% tin) layer 54; and further Lee discloses at least a tri-layer pillar structure equivalent (Fig. 10) comprising: upper layer 58 "is a layer of solder compound", middle (UBM) layer 56 "typically comprising nickel" (Col. 5, line 46) and "may contain multiple layers of metal such as layers of chrome, followed by a layer of copper, followed by a layer of gold" (Col. 6, lines 21 to 23) and lower layer 54 "typically comprising copper" (Col. 5, lines 42 and 43). So Lee does not cure any deficiency of Kondoh, and visa versa, as applied to the amended claims in the instant patent application. Further, *inter alia*, the prior art lack a suggestion that Kondoh should be modified in a manner required to meet the claims.

Therefore claims 1 to 13, 16, 19 to 35, 38, 41 to 58, 61 and 64 to 71 are submitted to be allowable over the cited references and reconsideration and allowance are respectfully solicited.

## CONCLUSION

In conclusion, reconsideration and withdrawal of the rejections are respectively requested. Allowance of all claims is requested. Issuance of the application is requested.

It is requested that the Examiner telephone Stephen G. Stanton, Esq. (#35,690) at (610) 296 - 5194 or the undersigned attorney/George Saile, Esq. (#19,572) at

Docket: APS 03 - 002

S/N: 10/682,054

(845) 452 - 5863 if the Examiner has any questions or issues that may be resolved to expedite prosecution and place this Application in condition for Allowance.

Respectively submitted,

A handwritten signature in black ink, appearing to read "Stephen B. Ackerman", is written over a horizontal line.

Stephen B. Ackerman  
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